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| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/080,944   | 02/22/2002  | Lisa A. Buckman      | 10004353-1          | 6545             |
| 57299  | 7590        | 11/16/2006           | EXAMINER            |                  |
| AVAGO TECHNOLOGIES, LTD.<br>P.O. BOX 1920<br>DENVER, CO 80201-1920 |             |                      |                     | BELLO, AGUSTIN   |
|  |             |                      | ART UNIT            | PAPER NUMBER     |
|  |             |                      | 2613                |                  |

DATE MAILED: 11/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

|                 |                |  |
|-----------------|----------------|--|
| Application No. | Applicant(s)   |  |
| 10/080,944      | BUCKMAN ET AL. |  |
| Examiner        | Art Unit       |  |
| Agustin Bello   | 2613           |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

1) Responsive to communication(s) filed on 01 September 2006.

2a) This action is FINAL. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

4) Claim(s) 1-10 and 12-21 is/are pending in the application.

4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

5) Claim(s) \_\_\_\_\_ is/are allowed.

6) Claim(s) 1-10 and 12-21 is/are rejected.

7) Claim(s) \_\_\_\_\_ is/are objected to.

8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some \*c) None of:  
1. Certified copies of the priority documents have been received.  
2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

1) Notice of References Cited (PTO-892)

2) Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.

4) Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.

5) Notice of Informal Patent Application (PTO-152)

6) Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-4, 8-9, 14-16, and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Robertson (U.S. Patent No. 5,857,042).

Regarding claims 1, 14, and 21 Robertson teaches a two-dimensional free space optical link (Figure 11) comprising: an array of tightly-coupled, multi-wavelength arrays of vertical cavity surface emitting lasers (VCSELS) (reference numeral 32<sub>1</sub>-32<sub>9</sub> in Figure 11), operating at predetermined wavelengths; collimating optics (reference numeral 29A-29I in Figure 9) for collimating the optical signals emitted from each said multi-wavelength array of VCSELs into a single uniform optical signal (as seen in Figure 3); and an array of tightly-coupled optical receiver arrays (e.g. the corresponding receiver array for Figure 11 and shown in Figure 3 and 9), each said receiver array being configured to receive the signals from one of said VCSEL arrays, wherein the wavelengths of the received signals generally match the wavelengths of the signals transmitted by said VCSEL arrays such that multiple optical wavelengths can be simultaneously communicated at high-speed from one of said VCSEL arrays to one of said receiver arrays across a very short haul channel.

Regarding claim 2, Robertson teaches that said VCSELS are selected from the group consisting of bottom-emitting VCSELS and top-emitting VCSELS (Figure 8).

Regarding claim 3, Robertson teaches that said VCSEL array is configured as a tightly-bound cluster of VCSELS (as seen in Figure 11).

Regarding claim 4, Robertson teaches the emitting elements of each VCSEL in said cluster form a small group positioned at the focal point of said collimating optics (as seen in Figure 3).

Regarding claims 8 and 15, Robertson teaches that said short haul channel is free space (as seen in Figures 3-7).

Regarding claims 9 and 16, Robertson teaches that said short haul channel is optical fibers (as seen in Figure 8).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Robertson in view of Baney (U.S. Patent No. 6,486,984).

Regarding claim 5, Robertson differs from the claimed invention in that Robertson fails to specifically teach that said tightly-coupled optical receiver array of the said receiver arrays comprise partitioned optical filters and mating photodetectors. However, Baney in the same field of optical communication, teaches tightly-coupled optical receiver arrays wherein said receiver arrays comprise partitioned optical filters and mating photodetectors (reference numerals 82, 84, 86 in Figure 4). One skilled in the art would have been motivated to employ

partitioned optical filters and mating photodetectors as taught by Baney in the device of Robertson in order to filter out interfering optical energy (column 7 lines 6-23). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to form the tightly-coupled optical receiver array of the said receiver arrays of Robertson so that they include partitioned optical filters and mating photodetectors as taught by Baney.

Regarding claims 6, the combination of Robertson and Baney teaches that said optical filters of each said optical receiver array further comprise multiple segments, each segment having an individual filter element designed to pass a transmitted optical signal with a specific wavelength range (Figure 4 of Baney).

Regarding claim 7, the combination of Robertson and Baney teaches that said photodetectors of each said optical receiver array further comprise multiple segments (Figure 9, 10B of Robertson; Figure 4 of Baney), each segment having an individual photodetector element that converts the transmitted optical signal received from each said filter element to an electrical signal.

5. Claims 10-12, 13, and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Robertson in view of Baney and Ciemiewcz (U.S. Patent No. 6,695,493).

Regarding claim 10, 17, Robertson teaches a method of creating a two-dimensional optical link, the method comprising: assembling a vertical cavity surface emitting laser (VCSEL) emitter array (Figure 11), wherein the VCSEL emitters in the array are arranged in a regular pattern; fabricating a receiver array (reference numeral 31A-31I in Figure 9), wherein the receiver array comprises a plurality photodetector arrangements (reference numeral 31A-31I in Figure 10B); and mounting the VCSEL emitter array and receiver array onto respective

transmitter and receiver electronic circuits configured to receive the respective emitter and receiver arrays (Figure 9-11). Robertson differs from the claimed invention in that Robertson fails to specifically teach that each VCSEL emitter is set for a different emissive wavelength and that the receiver array includes a plurality of optical filters mating with the plurality of photodetector. However, Baney in the same field of optical communication, teaches tightly-coupled optical receiver arrays wherein said receiver arrays comprise partitioned optical filters and mating photodetectors (reference numerals 82, 84, 86 in Figure 4). One skilled in the art would have been motivated to employ partitioned optical filters and mating photodetectors as taught by Baney in the device of Robertson in order to filter out interfering optical energy (column 7 lines 6-23). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to form the tightly-coupled optical receiver array of the said receiver arrays of Robertson so that they include partitioned optical filters and mating photodetectors as taught by Baney.

Furthermore, Ciemiewcz in the same field of optical communication teaches that each VCSEL emitter is set for a different emissive wavelength (column 4 lines 28-41). One skilled in the art would have been motivated to emit different wavelengths from each of the emitters in order to accomplish wavelength division multiplexed transmissions (column 1 lines 58-65 of Ciemiewcz). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to allow each VCSEL emitter to transmit a different emissive wavelength.

Claim 18, recites a combination of claims 6 and 7 that were rejected above. As such, claim 18 is rejected for the same reasons as stated in the rejection of claims 6 and 7.

Regarding claim 12 and 19, Robertson teaches that said short haul channel is free space (as seen in Figures 3-7).

Regarding claim 13 and 20, Robertson teaches that said short haul channel is optical fibers (as seen in Figure 8).

***Response to Arguments***

6. Applicant's arguments filed 9/01/06 regarding the rejection of the claims have been fully considered but they are not persuasive. As previously noted and repeated here, the examiner believes that Robertson meets applicant's claim to "an array of tightly coupled, multi-wavelength arrays of vertical cavity surface emitting lasers."

As to applicant's argument that the Robertson's collimating optics fail to meet applicant's limitations of "collimating optics for collimating the optical signals emitted from each said multi-wavelength array of VCSELs into a single uniform optical signal," the examiner notes that each of the arrays of the VCSEL arrays in the plurality of arrays of Figure 11 further comprises a collimating optics as shown in Figure 9 and function according the principles shown in Figure 3. In the examiner's opinion, theses Figures, when taken together, show collimating optics which collimate optical signals emitted from each said multi-wavelength array of VCSELs into a single uniform optical signal. This opinion is based on the fact that each of the collimating optics for each of the array of arrays collimates the output for each of the VCSELs in the array to form a single uniform optical signal comprising slightly overlapping columns of light (Figure 3).

As to applicant's argument that Robertson fails to specifically teach a multi-wavelength array. The examiner notes that each of the VCSELs produces an individual wavelength and

further that there are a multiple VCSELs in each array. Therefore, Robertson teaches the claimed multi-wavelength array.

The balance of the applicant's arguments directed to the receiver portion of the claimed invention also fail to persuade the examiner that the applicant's claimed invention is patentable over the prior art for the same reasons stated above. Furthermore, the examiner maintains that Baney teaches the filter/detector pairings lacking in Robertson. The examiner only relies of Baney for disclosure of the filter and photodetector pairs and not the splitter also disclosed by Baney.

7. Applicant's arguments filed 4/27/06 regarding the rejection of claims 1-4, 8-9, and 14-16 with the Robertson reference have been fully considered but they are not persuasive. The applicant argues that Robertson fails to specifically mention, "tightly coupled." However, in the examiner's opinion, the arrays are clearly shown as tightly coupled in Figure 11 of Robertson. Furthermore, the terminology "tightly coupled" is relative language that can be interpreted in a variety of different ways. As such the examiner maintains that the Robertson reference teaches "tightly coupled" arrays within an array.

Next, the applicant argues against the rejection of claims 1-4, 8-9, and 14-16 with the Robertson reference since the applicant contends that Robertson fails to teach a "multi-wavelength array." However, the examiner disagrees. When the language of claim 1 is contrasted with the language of claims 10 and 17, it becomes clear that the multi-wavelength array claimed does not require that each VCSEL be set for a different wavelength. As such, Robertson, when given the broadest reasonable interpretation, teaches that the tightly coupled arrays produce multiple wavelengths. Whether those wavelengths are at the same wavelength or

at a different wavelength is irrelevant in claim 1 since the applicant has failed to recite language which positively provides for either. The only requirement is that the tightly coupled arrays produce multiple wavelengths. The examiner maintains that this requirement is met by Robertson.

***Conclusion***

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Agustin Bello whose telephone number is (571) 272-3026. The examiner can normally be reached on M-F 8:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571)272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AB



**AGUSTIN BELLO**  
**PRIMARY EXAMINER**